DETAILED ACTION

This is a response to Applicant's amendment filed on July 11, 2011.

Claims 1-3 and 6-11 are pending in the application. Claims 4-5 have been canceled.

Response to Arguments

Applicants argue that the instant invention is non-obvious over **Hashimoto**, et al. (U.S. 4,350,665), in view of **Dunster**, et al. (U.S. 4,865,820) or **Hashimoto**, in view of **Dunster** and **Zardi** (U.S. 4,372,920), because **Hashimoto** fails to teach or suggest separate oxygen jets which do not overlap prior to reaching the catalyst bed. **Hashimoto** discloses circular gas distributors such as concentric annular rings, the gas jets issuing from the distributor rings and clearly teaches that the jets are oriented so that they intersect or overlap (Figure 7C). **Hashimoto** intends to rapidly mix the oxygen with the surrounding hydrocarbon-containing gas and produce a uniform mixture. There is nothing in **Dunster** and/or **Zardi** which would teach or suggest non-overlapping gas jets. Applicants argue that mixing due to overlapping jets results in undesirable side reactions between the oxygen and the hydrocarbon, and therefore should be avoided. Applicant's arguments and request for reconsideration of the finality of the rejection of the last Office Action are considered persuasive. Therefore, the finality of that action is withdrawn.

Response to Amendment

The previous 35 USC §103 rejections of claims 1-3 and 6-11 are withdrawn in view of Applicants' amendments.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Ms. Elizabeth C. Richter on July 28, 2011.

The specification has been amended as follows:

On page 1 of the specification, please amend the second paragraph as follows:

There are a series of catalytic ~~methods, in which~~ methods in which oxygen is additionally fed to the ~~treating~~ reacting gas in a reactor, like in the so called oxy-dehydration of propane or butane, where the oxygen is mixed with the gas ~~flowing in~~ flowing into the oxy-dehydration ~~reactors~~ reactor before ~~entering into~~ contacting the catalyst. It has been especially seen that ~~especially~~ the irregular ~~through-~~mixing of the gas flowing into the catalyst with oxygen leads to unsatisfactory results, perhaps because of soot formation above the catalyst or due to insufficient material yield, like the yield of propylene.

On page 1 of the specification, please amend the third paragraph as follows:

~~There is where this~~ This invention ~~comes in with~~ accomplishes the task of clearly improving the ~~mixing-in and mixing-through~~ mixing of the oxygen above the ~~catalyst~~ catalyst, particularly for oxy-dehydration ~~process~~ processes.

On page 1 of the specification, please amend the fourth paragraph as follows:

This task is ~~fulfilled~~ accomplished according to the invention with the help of a method of the type described above, where the oxygen is fed to a ring distributor system arranged above the catalyst bed and is nozzle-jetted on to the catalyst surface through several exit holes in the ring distributor at an angle inclined away from the vertical. The oxygen could be present in pure form, ~~as air~~ as air, or mixed with inert gas or water vapour.

On page 1 of the specification, please amend the fifth paragraph, which continues onto page 2, as follows:

It has been seen with the help of this method ~~a through-mixing~~ that mixing can be achieved within a very short time 100 ms, so that the reaction time in zones with over-stoichiometric oxygen concentrations and the non-catalytic reactions get minimised. As the mixing takes place in ~~open air~~ the open space above the catalyst bed and the oxygen-rich ~~mixing~~ mixture has no contact with walls or the catalyst, damage caused to materials due to the nozzle-jetted oxygen gets minimised.

On page 2 of the specification, please amend the first full paragraph as follows:

~~Extended~~ Alternative designs of the invention can be ~~obtained~~ understood from the sub-claims. Depending on the reactor design it could be favourable to carry out jetting of the oxygen only in the direction of the reactor center or only in the ~~direction on to~~ direction of the reactor wall or even in tangential direction, whereby there is obviously a further variant, where these ~~flow-in~~ flow directions of the oxygen can ~~be foreseen~~ occur in one as well as also in the other direction simultaneously if required in different axial planes. With the different ~~on-flow-angles~~ flow angles, while ~~additionally equipping~~ modifying already existing plants one can adapt to the respective reactor design.

On page 3 of the specification, please amend the second paragraph as follows:

Design extensions of the invention can be ~~obtained~~ understood from the sub-claims relating to the device.

On page 4 of the specification, please amend the first paragraph as follows:

The oxy-reactor depicted schematically in ~~section~~ cross-section in Fig. 1 and generally denoted by the reference sign 1 ~~ahs a gas~~ has a gas inlet pipe 2 that centrically penetrates a horizontally arranged catalyst 3, where a gas dome 4 is formed above the catalyst bed in the reactor.

On page 4 of the specification, please amend the second paragraph as follows:

The centric gas inlet pipe 2 is surrounded by a ring distributor 5 for oxygen in pure form, as air or mixed with inert gas or water vapour, where this ring pipe 5 feeds several ring pipes 7 equipped with exit ~~opening~~ openings 6 that are arranged above the ~~catalyst 3, the~~ catalyst 3. See Fig. 2. The exit openings 6 are arranged in such a way that the respective oxygen jet meets the catalyst surface at an angle deviating from the vertical, whereby in Fig. 3 the vertical meeting situation is depicted ~~an in~~ as in Fig. 4 a situation according to the invention.

On page 4 of the specification, please amend the fourth paragraph as follows:

With the help of the inclined meeting direction of the oxygen jet on to the catalyst bed as indicated ~~also~~ in Fig. 4, among other things one can prevent a large-spaced circulation of the oxygen containing gas.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance: A thorough search for pertinent prior art did not locate any prior art that discloses or suggests the invention recited in claims 1-3 and 6-11. The concept of a process for jetting oxygen onto the surface of a oxidative dehydrogenation catalyst such that (i) the jets are at an angle inclined to the surface of the catalyst, (ii) the jets do not overlap or intersect, (iii) the distributor is comprised of concentric rings, and (iv) the residence time of the oxygen in the space above the catalyst is less than 1 second is considered novel. The closest prior art which discloses a gas distributor comprised of concentric rings (**Hashimoto**)

discloses that the jets intersect or overlap. Furthermore, **Hashimoto** does not teach or suggest that the jets should be kept from overlapping, but instead discloses means to ensure mixing of the gas exiting the nozzles in the distributor. The closest prior art which teaches utilizing non-overlapping gas jets inclined at an angle to the surface of the catalyst [**Reed**, et al. (U.S. 4,166,834)] does not teach or suggest concentric ring distributors, residence times less than 1 second, or the introduction of oxygen into an oxidative dehydrogenation process. The closest prior art which discloses short residence times, i.e., less than 1 second, in the space above the surface of a oxidative dehydrogenation catalyst (**Dunster**) does not teach or suggest non-overlapping gas jets produced by a gas distributor. Like **Hashimoto**, **Dunster** teaches rapidly mixing of gases exiting the distributor followed by contact of the mixed gas with the catalyst. Furthermore, **Dunster** teaches that divergent nozzles should be used, so the resulting gas jets expand and intersect as they approach the catalyst surface. Finally, **Zardi** is silent regarding the geometry of gas jets in oxidative dehydrogenation reactors.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRADLEY ETHERTON whose telephone number is

(571)270-5478. The examiner can normally be reached on Monday through Friday, 7:30 a.m. to 5:00 p.m. EST, with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, InSuk Bullock can be reached on (571) 272-5954. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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